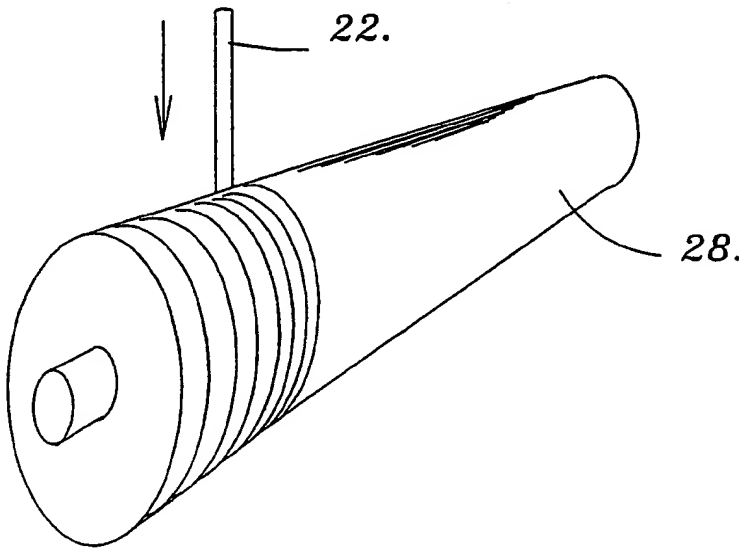




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : D21F 3/08, D21G 1/02	A1	(11) International Publication Number: WO 94/09208 (43) International Publication Date: 28 April 1994 (28.04.94)
(21) International Application Number: PCT/US93/08537 (22) International Filing Date: 9 September 1993 (09.09.93) (30) Priority data: 07/962,636 16 October 1992 (16.10.92) US (71) Applicant: BELOIT TECHNOLOGIES, INC. [US/US]; 300 Delaware Avenue, Suite 512, Wilmington, DE 19801-1622 (US). (72) Inventors: BONANDER, James ; 1107 Fairview Road, #8, Clarks Summit, PA 18411 (US). SLAGOWSKI, Eugene, L. ; 903 Longview Terrace, Waverly, PA 18471 (US). (74) Agent: ARCHER, David, J.; One St. Lawrence Avenue, Beloit, WI 53511 (US).		(81) Designated States: CA, JP, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>
(54) Title: A METHOD OF MANUFACTURING A COVER FOR A PRESS ROLL <div style="text-align: center;">  </div> (57) Abstract <p>A method of manufacturing a cover for a press roll includes the steps of feeding epoxy matrix (10) into a container (12) and agitating the same. Filler material (16) is added to the matrix (10) while the matrix is being agitated. The matrix (10) and filler (16) are conveyed to an application zone (18). A roll (20) of reinforcing material (22) is unwound such that the unwound reinforcing material (22) extends past the application zone (18). The agitated matrix (10) and filler (16) is applied to the unwound material (22) during passage of the material past the application zone (18). The reinforcing material (22) with the matrix (10) and filler (16) applied thereto are then spirally wound around the press roll (28) such that the press roll (28) is covered with the reinforcing material (22) impregnated with the matrix (10) and filler (16). The arrangement is such that the surface characteristics of the resultant cover are dependent on the amount and type of filler material added to the matrix (10).</p>		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	MR	Mauritania
AU	Australia	GA	Gabon	MW	Malawi
BB	Barbados	GB	United Kingdom	NE	Niger
BE	Belgium	GN	Guinea	NL	Netherlands
BF	Burkina Faso	GR	Greece	NO	Norway
BG	Bulgaria	HU	Hungary	NZ	New Zealand
BJ	Benin	IE	Ireland	PL	Poland
BR	Brazil	IT	Italy	PT	Portugal
BY	Belarus	JP	Japan	RO	Romania
CA	Canada	KP	Democratic People's Republic of Korea	RU	Russian Federation
CF	Central African Republic	KR	Republic of Korea	SD	Sudan
CG	Congo	KZ	Kazakhstan	SE	Sweden
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovak Republic
CM	Cameroon	LU	Luxembourg	SN	Senegal
CN	China	LV	Latvia	TD	Chad
CS	Czechoslovakia	MC	Monaco	TG	Togo
CZ	Czech Republic	MG	Madagascar	UA	Ukraine
DE	Germany	ML	Mali	US	United States of America
DK	Denmark	MN	Mongolia	UZ	Uzbekistan
ES	Spain			VN	Viet Nam
FI	Finland				

(1)

PATENT APPLICATION

TITLE: A METHOD OF MANUFACTURING A COVER FOR A PRESS ROLLBackground of the InventionField of the Invention

The present invention relates to a method of manufacturing a cover for a press roll. More specifically, the present invention relates to a method of manufacturing a cover for a press roll which includes spirally winding reinforcing material around the press roll.

Information Disclosure Statement

In the papermaking art, a formed web is guided through a press section for removing water from the web.

Steel press rolls have been covered with rubber or synthetic material in order to enhance the water removing capability of the press.

Often, it has been the practice to add filler particles to the rubber compounds prior to application of the rubber compound to the steel roll shell in order to change the hardness of the resultant cover.

Additionally, fillers have been added to urethane in order to increase the hardness of the cover.

However, more recently, it has been found advantageous to impregnate reinforcing material with a urethane material and to spirally wind the same onto a roll shell. However, such spiral winding of the

(2)

reinforcing material does not readily permit the addition thereto of the aforementioned filler particles.

The present invention overcomes the problem of adding filler to the spirally wound reinforcing material by applying the filler to an epoxy matrix prior to the application of the mixture to the reinforcing material.

Therefore, the present invention provides a method of manufacturing a cover for a press roll that overcomes the aforementioned inadequacies of the prior art arrangements and which makes a considerable contribution to the art of manufacturing a cover for a press roll.

Other objects and advantages of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description contained hereinafter, taken in conjunction with the annexed drawings.

Summary of the Invention

The present invention relates to a method of manufacturing a cover for a press roll. The method includes the steps of feeding an epoxy matrix into a container and agitating the matrix. Filler material is added to the matrix while the matrix is being agitated, and the matrix and filler are then conveyed to an application zone. Reinforcing material is unwound from a roll such that the material extends past the application zone. The agitated matrix and filler are applied to the unwound material during passage of the material past the application zone. The reinforcing material, together with the matrix and filler, are then spirally wound around the press roll such that the press roll is covered with the reinforcing material impregnated with the matrix and filler. The arrangement is such that the surface characteristics

(3)

of the resultant cover are dependent on the amount and type of filler material added to the matrix.

In a more specific embodiment of the present invention, the epoxy matrix is a polymeric thermo-plastic matrix.

In another embodiment of the present invention, the matrix is a polymeric thermo-set matrix.

The filler material is composed of either mineral particles, synthetic particles or refractory particles.

The particles in one embodiment of the invention have a diameter less than one (1) millimeter, and in another embodiment of the present invention, the particles have a diameter of at least one (1) millimeter.

In another embodiment of the present invention, the filler material includes PTFE powder, together with glass fibers. In yet another embodiment of the present invention, the filler material includes PTFE powder, together with ceramic fibers.

Additionally, in another embodiment of the present invention, the filler material includes PTFE powder, together with quartz fibers and feldspar particles.

The reinforcing material is either a woven material, a knitted material, a braided material or a non-woven material.

The step of spirally winding the reinforcing material is carried out during the cross-linking of the matrix.

(4)

Many variations and modifications of the combination of method steps according to the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description contained hereinafter. However, such modifications and Variations fall within the spirit and scope of the present invention as defined by the appended claims.

Brief Description of the Drawings

Figure 1 is a schematic view representing the step of feeding the epoxy matrix into a container and agitating the same;

Figure 2 is a similar view to that shown in Figure 1, but shows filler material being added to the matrix while the matrix is being agitated;

Figure 3 is a similar view to that shown in Figure 2, but shows the agitated matrix and filler being conveyed to an application zone and being applied to reinforcing material being unwound from a roll of reinforcing material; and

Figure 4 is a perspective view showing a press roll being spirally wound with the reinforcing material and matrix and filler according to the present invention.

Detailed Description of the Drawings

Figure 1 is a schematic view illustrating a method of manufacturing a cover for a press roll shell according to the present invention. Figure 1

(5)

shows an epoxy matrix 10 disposed within a container 12. The epoxy matrix 10 is being agitated by an agitator 14.

Figure 2 is a similar view to that shown in Figure 1, but shows filler material 16 being added to the matrix 10 while the matrix 10 is being agitated within the container 12.

Figure 3 is a similar view to that shown in Figure 2, but shows the agitated matrix 10 and filler 16 being conveyed and pumped via pump P to an application zone, generally designated 18.

A roll 20 of reinforcing material 22 is unwound, as indicated by the arrow 26, such that the reinforcing material 22 extends past the application zone 18.

The agitated matrix and filler 10 and 16 are applied, as indicated by the arrow 26, to the unwound material 22 during passage of the unwound material 22 past the application zone 18.

Figure 4 is a perspective view of a press roll 28 and shows the roll 28 being spirally wound with the reinforcing material 22, the matrix 10 and filler 16 having been previously applied to the reinforcing material 22. The arrangement is such that the press roll 28 is covered with the reinforcing material 22, which is impregnated with the matrix 10 and filler 16. The surface characteristics of the resultant cover are consequently dependent on the amount and type of filler material 16 added to the matrix.

In specific embodiments of the present invention, the matrix 10 is either a polymeric thermo-plastic matrix or a polymeric thermo-set matrix.

(6)

The filler material 16 is either composed of mineral particles, synthetic particles or refractory particles.

In one embodiment of the present invention, the filler material 16 includes particles having a diameter of less than one (1) millimeter, and in another embodiment of the present invention, the filler material 16 includes particles having a diameter of at least one (1) millimeter.

Additionally, the filler material 16 includes either PTFE powder together with glass fibers, PTFE powder together with ceramic fibers, or PTFE powder together with quartz fibers and feldspar particles.

The reinforcing material 22 is either a woven material, a knitted material, a braided material or a non-woven material.

The step of spirally winding the reinforcing material 22 is carried out during the cross-linking of the matrix.

The present invention provides a method of manufacturing a roll cover which exhibits the required durometer hardness for the particular type of paper being pressed.

Such hardness of the cover is not only a requirement according to the type of paper being manufactured, but also a requirement according to the type of coating that will be applied thereto for subsequent calendering.

Additionally, roll covers of varying durometer hardness will be required dependent upon the type of furnish being used.

(7)

Although the present invention has been described with particular application to the provision of a cover for a press roll, it will be appreciated by those skilled in the art that such roll covers will also be applicable in soft calendering and the like.

(8)

WHAT IS CLAIMED IS:

1. A method of manufacturing a cover for a press roll, said method comprising the steps of:

feeding an epoxy matrix (10) into a container (12);

agitating the epoxy matrix (10);

adding filler material (16) to the matrix (10) while the matrix is being agitated;

conveying the agitated matrix and (10) filler (16) to an application zone (18);

unwinding a roll (20) of reinforcing material (22) such that the unwound reinforcing material (22) extends past the application zone (18);

applying the agitated matrix (10) and filler (16) to the unwound material (22) during passage of the unwound material past the application zone (18); and

spirally winding the reinforcing material (22) with the matrix (10) and filler (16) applied thereto around the press roll (28) such that the press roll (28) is covered with the reinforcing material (22) impregnated with the matrix (10) and filler (16), the arrangement being such that the surface characteristics of the resultant cover are dependent on the amount and type of filler material added to the matrix.

2. A method of manufacturing a cover as set forth in claim 1, wherein the feeding step includes:

feeding a polymeric thermo-plastic matrix into the container (12).

3. A method of manufacturing a cover as set forth in claim 1, wherein the feeding step includes:

(9)

feeding a polymeric thermo-set matrix into the container (12).

4. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding mineral particles to the matrix (10).

5. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding synthetic particles to the matrix (10).

6. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding refractory particles to the matrix (10).

7. A method of manufacturing cover as set forth in claim 1, wherein the step of adding filler material includes:

adding material having a particle size less than one (1) millimeter in diameter.

8. A method of manufacturing cover as set forth in claim 1, wherein the step of adding filler material includes:

adding material having a particle size of at least one (1) millimeter in diameter.

9. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding PTFE powder, together with glass fibers.

10. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

(10)

adding PTFE powder, together with ceramic fibers.

11. A method of manufacturing a cover as set forth in claim 1, wherein the step of adding filler material includes:

adding PTFE powder, together with quartz fibers, together with feldspar particles.

12. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a woven material.

13. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a knitted material.

14. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a braided material.

15. A method of manufacturing a cover as set forth in claim 1, wherein the reinforcing material (22) is a non-woven material.

16. A method of manufacturing a cover as set forth in claim 1, wherein the step of spirally winding the reinforcing material (22) is carried out during the cross-linking of the matrix (10).

1 / 1

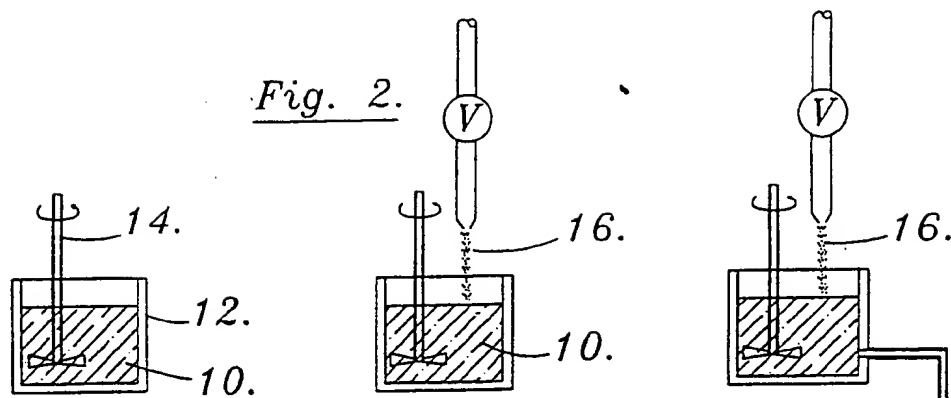


Fig. 1.

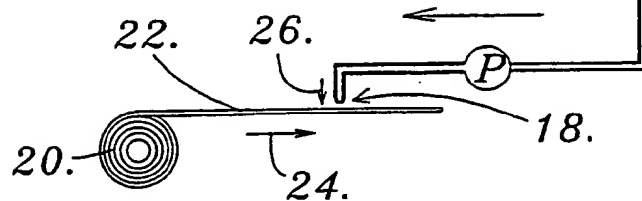


Fig. 3.

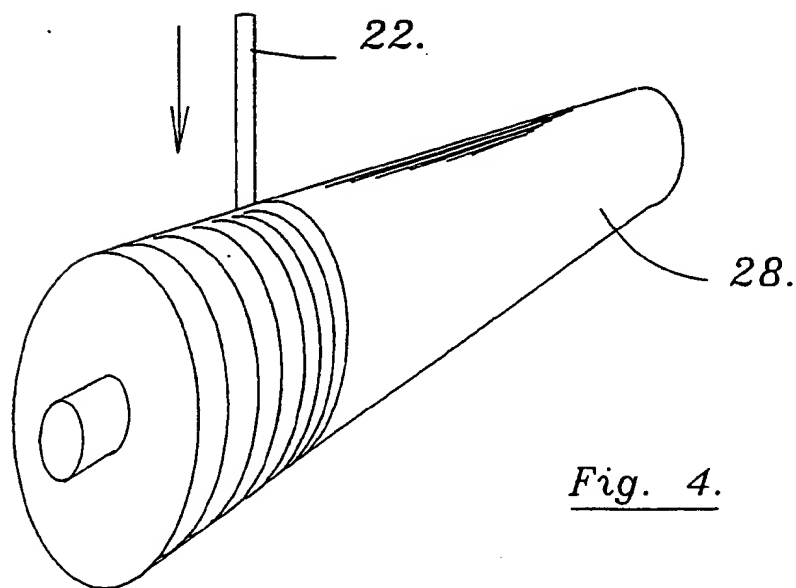


Fig. 4.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 93/08537

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 D21F3/08 D21G1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 D21F D21G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB,A,2 057 092 (YAMAUCHI RUBBER) 25 March 1981 see the whole document ---	1,3-6, 12,15
A	EP,A,0 146 342 (KERN RUBBER COMPANY) 26 June 1985 see the whole document ---	1-3,12, 13
A	US,A,3 069 304 (E. FAHRBACH ET AL) 18 December 1962 see the whole document ---	1,3,16
A	EP,A,0 487 477 (VALMET PAPER MACHINERY) 27 May 1992 ---	
A	DE,A,23 30 565 (BELOIT) 17 January 1974 -----	

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *A* document member of the same patent family

Date of the actual completion of the international search

23 December 1993

Date of mailing of the international search report

12. 01. 94

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tlx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

De Rijck, F

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter. Application No.

PCT/US 93/08537

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A-2057092	25-03-81	JP-C- 1263049	16-05-85
		JP-A- 56028312	19-03-81
		JP-B- 59036133	01-09-84
		AU-B- 518775	22-10-81
		AU-A- 6109480	12-02-81
		CA-A- 1157757	29-11-83
		DE-A, C 3029288	26-03-81
		FR-A, B 2462997	20-02-81
		SE-B- 453062	11-01-88
		SE-A- 8005593	11-02-81
		US-A- 4368568	18-01-83
EP-A-0146342	26-06-85	US-A- 4576845	18-03-86
		CA-A- 1255529	13-06-89
US-A-3069304		NONE	
EP-A-0487477	27-05-92	CA-A- 2054383	20-05-92
DE-A-2330565	17-01-74	AU-A- 5710673	19-12-74
		BE-A- 800545	01-10-73
		CA-A- 975204	30-09-75
		CH-A- 577642	15-07-76
		GB-A- 1422809	28-01-76
		NL-A- 7307841	21-12-73
		SE-B- 402879	24-07-78
		US-A- 3800381	02-04-74